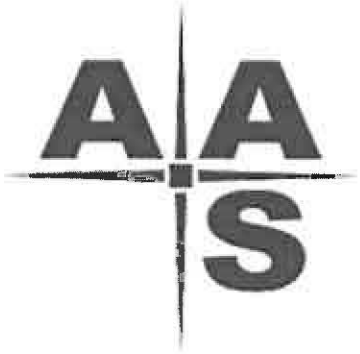

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Title:
Discovery Of A Rossby Wave In Jupiter's South Equatorial Region

Author Block:
Amy A. Simon-Miller[1], D. S. Choi[2], J. H. Rogers[3], P. J. Gierasch[4]
[1]NASA's GSFC, [2]ORAU/NASA's GSFC, [3]British Astronomical Association, United Kingdom, [4]Cornell University.

Abstract:
A detailed study of the chevron-shaped dark spots on the strong southern equatorial wind jet near 7.5 deg S planetographic latitude shows variations in velocity with longitude and time. The chevrons move with velocities near the maximum wind jet velocity of ~140 m/s, as deduced by the history of velocities at this latitude and the magnitude of the symmetric wind jet near 7 deg N latitude. Their repetitive nature is consistent with an inertia-gravity wave (n = 75-100) with phase speed up to 25 m/s, relative to the local flow, but the identity of this wave mode is not well constrained. However, high spatial resolution movies from Cassini images show that the chevrons oscillate in latitude with a ~7-day period. This oscillating motion has a wavelength of ~20 deg and a speed of ~100 m/s, following a pattern similar to that seen in the Rossby wave plumes of the North Equatorial Zone, and possibly reinforced by it, though they are not perfectly in phase. The transient anticyclonic South Equatorial Disturbance (SED) may be a similar wave feature, but moves at slower velocity. All data show chevron latitude variability, but it is unclear if this Rossby wave is present during other epochs, without time series movies that fully delineate it. In the presence of multiple wave modes, the difference in dominant cloud appearance between 7 deg N and 7.5 deg S may be due to the presence of the Great Red Spot, either through changes in stratification and stability or by acting as a wave boundary.

Category:
Jovian Planets: Atmosphere